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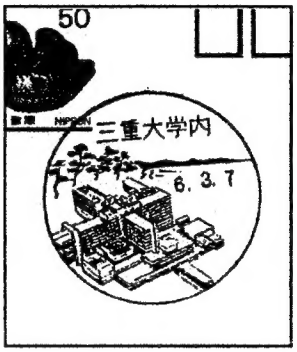
**Postscript** : Great Britain has finally come out with a stamp commemorating Jenner. It is shown herewith.

## SOME INTERESTING CANCELS FROM JAPAN

Junichi Haniu MD, Tokyo, Japan.

The cancel on the left was used during the Tenth International Conference on AIDS held in 1994. It is shown used on the special stamp issued on that occasion (Scott ).

The cancel on the right shows the MIE Medical School and Hospital.




## THE DEVELOPMENT OF X-RAY SCREENS AND FILM IN RADIOLOGY

Carolyn Kemery, Willoughby, OH.

"No discovery in my lifetime, has ever aroused the interest of the entire world as did the discovery of x rays," said Michael Idvorsky Pupin. This quote came from one of the great immigrant physicist-inventors that made our country the dominant invention centers of the world.

Pupin was born in Idvor, Hungary (now Yugoslavia) on October 4th, 1858 to Serbian settlers, who were encouraged to educate their gifted son. He came to the USA at the age of fifteen, where through employment and scholarship he managed to graduate from Columbia University. He then went to Cambridge and then on to the University of Berlin, where he studied with Hermann von Helmholtz, thus, earning his doctorate in 1889. He returned to Columbia as a professor of electromechanics from 1901 - 1931. In 1924 he won the Pulitzer Prize for his autobiography, *From Immigrant to Inventor*. He died in new York City March 12, 1935.

The brilliant, glory hungry Pupin tried to claim the discovery of x ray as his. Historically, this has been proven incorrect. However, he was the first to use fluorescent intensifying screens with his dry plates. These screens shortened exposure time; thus, patient radiation-exposure was reduced. The screens improved definition quality by reducing patient motion that blurred images.

These screens were a tremendous advancement in radiology. They enabled Pupin to produce the highest quality x rays of the day. Through the use of these screens, pellets were removed surgically from a famous lawyer of the day. Screens are still used today in fluoroscopy units and

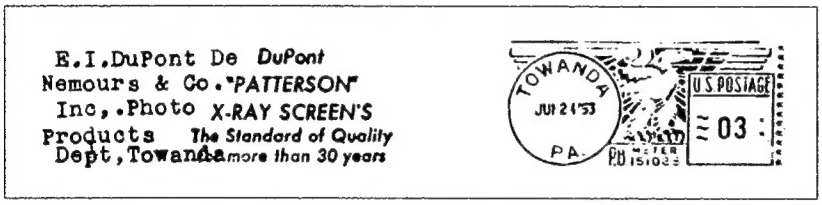
inside x-ray cassettes.
Stamps:
Yugoslavia (fig. 1) 12-24-1960 Scott # 594
10-09-1997 Scott # 1445 (not shown)
Bosnia/Serbian (fig. 1) 1997 Serbian coat of arms

Figure 1

Figure 1 Pupin

Carl V. S. Patterson was a screen manufacturer, who developed intensifying screens to a truly high standard. He produced high quality fluorescent chemicals. The addition of the most minute substance influenced the fluorescent chemical. By 1916, he used perfect fine granules of synthetic calcium tungstate in his chemistry. These produced brilliant fluorescence, with low after glow. His whole operation used tight quality control standards. This meant that all radiology facilities using given Patterson products and identical factors would obtain the same x ray results.

Patterson developed cassettes with two screens; the front one was thin and the back one thick. This reduced the exposure time and therefore, the radiation exposure to the patient.




Cover: USA (fig. 2) 06-24-1953; Metered cancel Advertising cover; Patterson X-Ray Screens

Research in the development of rare earth phosphors eventually led to the manufacture of rare earth screens for x-ray cassettes. Previous technology used the blue emitting phosphors. These screens used green emitting gadolinium phosphors that were used with orthochromatic film sensitive to green light. The absorption characteristics of this new phosphor was extremely efficient in the conversion of x-ray energy to light. This made exposures twice as fast and therefore reduced the radiation exposure to the patient. The stamp shown has no proven connection to rare earth screens, but it is included to illustrate the concept of rare earth screens.
Stamp: India (fig. 3 ); 01-26-1955; Scott # 269; Rare earth factory

Figure 3

George Eastman was born to an old American pioneering family, July 12th, 1854 in Waterville, New York. Early in his career, he gave up a career in banking to devote his time to photography.

Figure 3

At the time, glass plates were used in x ray radiographs. Because glass was so fragile and scarce at the time of WWI, Eastman's single coated and later double coated film were a boom to the new technology. His early cellouse nitrate base used with these films was technically excellent, but highly flammable. He produced x-ray film on a safety base of cellulose acetate, in 1924.

The giant Eastman Kodak plant in Rochester, New York developed its own x-ray division, where every darkroom need was manufactured. Kodak produced excellent educational material for every x-ray need. George Eastman died in 1932.
Stamp: USA (Fig. 4 ); 07-12-1954; Scott # 1062

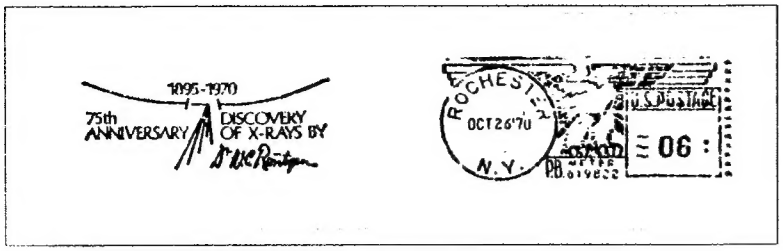



Figure 5

USA (fig. 5 ); 10-26-1970; Cancel - 1895 - 1970 with stylized x-ray tube, 75th anniversary of the discovery of x ray, Wilhelm Roentgen signature, Rochester, New York, Home of Eastman Kodak

The development of x-ray film had its foundation in the beginnings of photography. From the very first, in 1553 when Giovanni Battista della Porta first made his endeavors with "camera obscura," early scientists struggled with creating a lasting image; paper, glass and eventually film provided challenges in their development. But, it was the camera and the human desire to record oneself for posterity that made the process of recording permanent images from x rays possible.

Different scientists tried various methods of recording camera images but always, the problem of non dissolved residual silver chloride persisted. Around 1780, the astronomer, Sir John Hershel discovered that sodium thiosulfate, "hypo" would dissolve residual silver chloride. In 1839 Reverend J. B. Reade dissolved the unesxposed silver salts with "hypo." This helped to preserve the image over time from the effects of light.

Louis Jacques Mande Daguerre discovered that accidentally spilled mercury "developed" latent images on plates stored in a confined area. Thus, he introduced chemical development of photosensitive material. Eventually, it was learned that it was not necessary to expose the paper in the camera but that even a barely visible image could be chemically developed outside the camera later. Exposure time was cut from an hour to thirty seconds. The "negative -positive method" was born; thus, Hershel coined the term photography (drawing with light.) The industry wavered from paper to glass and back. Paper was grainy and glass fragile. Various coating emulsions improved images from both paper and glass.

When wet glass plates gave way to "dry plates," the industry was on its way. Dry plates were faster. Soon they were being manufactured worldwide. It was at this time, that George Eastman arrived on the scene with his plate coating machine for mass production. It was Eastman who would develop the x-ray film industry.

Figure 6

Stamps:

Peoples' Republic of China (fig. 6); 10-13-1995; Scott #s 2620-1 ;Black and white film & color film.

Seal:
Hungary (fig. 7) 1967; Green # 201; 1968; Green # 202 ;Photofluoroscopic film for miniature chest x rays.

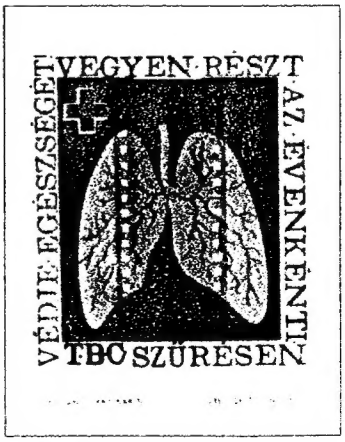



Figure 7

Many types of film are used in a variety of ways in the x-ray film industry. Film is used in x ray to directly record examinations. The patient's body part is placed over the film within a cassette. In fluoroscopy, the cassette-film is placed over the body part because it must be above the fluoroscopy screen. In photo fluoroscopy used in the miniature x-ray units popular in the 50s and 60s, special film was contained in a reel.

Depending on the type of examination performed, a certain type of film is selected. Digital modalities such as CAT scan and MRI use single emulsion film. Mammography uses a specialized type of single emulsion film. Routine x rays such as chest, extremity or spine use double emulsion film, because they are between two intensifying screens, within a cassette. Using the two screens maximizes the benefit of the radiation applied. Cardiac catheterization is one example of a procedure requiring cine film.

Figure 8

Hungary (fig. 8); 05-16-1947; Scott # B 196; Doctor viewing chest x ray.; Routine chest x ray uses double emulsion film. Macedonia (fig. 9); 08-01-1992;Scott #s 5464-7; Mammography, MRI and ultrasound equipment.- Procedures that use specialized single emulsion film.

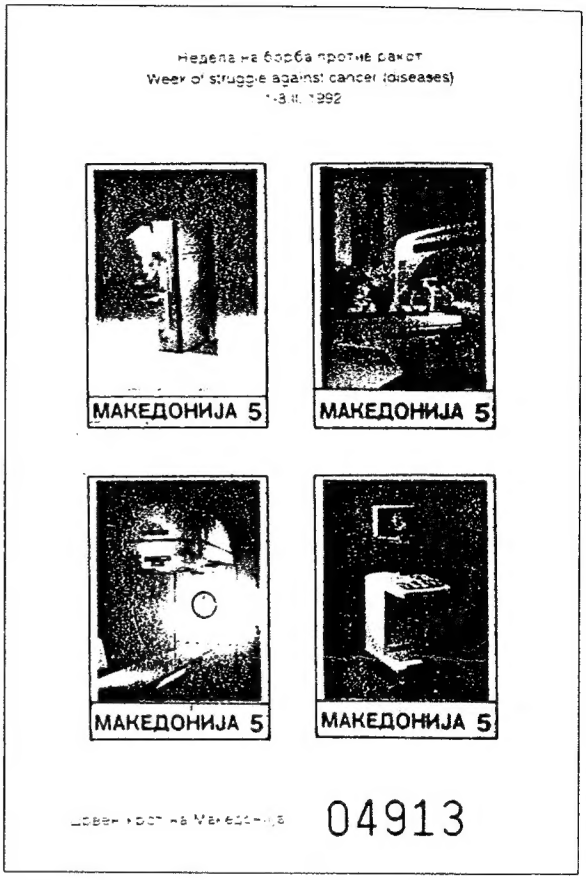



Figure 9

Netherlands (Fig. 10); 1954 ;Green # 172 seal; Doctor viewing chest on fluoroscopy screen.

Fugure 10

This image can be permanently recorded on film.

Korea (fig. 11); 11-16-1961;Scott # 332; Schematic of patient being x-rayed using photo fluoroscopy. X-ray van is in background. Specialized reel film was used for this purpose.

Germany, Berlin (fig. 12): 01-07-1985; Cancel & advertising cover; VEB Fotochemische Werke x-ray film and chemistry company. India ( fig. 13 ); 04-29-98; Hindustan Film Co. Advertising cover.

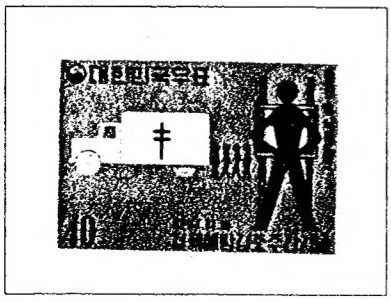


Figure 11

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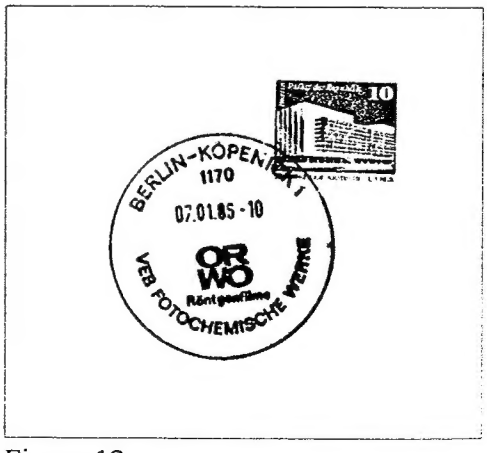


Figure 12

Medical Radiology, New York, Pergamon Inc., 1967.

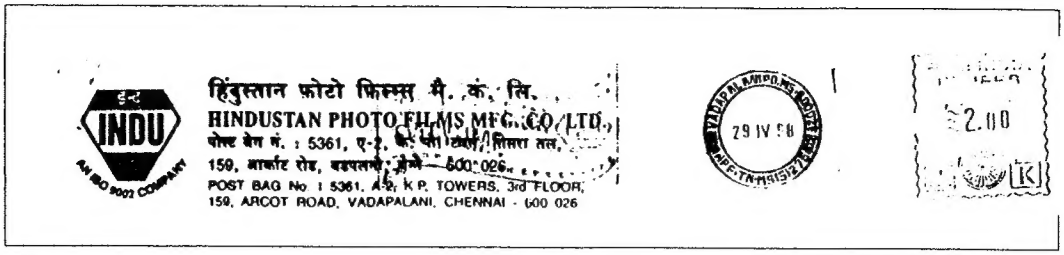


Figure 13

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## CANADIAN MILLENIUM COLLECTION :STAMPS OF MEDICAL INTEREST

Dr. Gwen Prout, Vancouver, B.C. Canada.

The Canadaian Postoffice has issued a Millennium Book that has the following stamps of medical interest. These will be separately available in early 2000 AD as souvenir sheets - each with 4 stamps. (I will keep you posted on these as they come out. -ed.)

- Powers of the Inuit Shamans
- Tribal Shamans - holistic approach to medicine
- Canadian Space Program - Canadarm; Canadian M.D.s in Space (?)
- Nursing - L'Hotel - Dieu
- Nursing - Pauline Vanier and Elizabeth Smellie - Women in War
- Banning Landmines (disabled) - Ottawa Convention - Nobel Prize for Peace
- CIDA - Wiping Out Disease (stethoscope)
- Dr. Lucille Teasdale - surgeon in Uganda - born in Montreal (died of AIDS after being infected during an operation.)
- Terry Fox - cancer research
- Meals on Wheels
- George Klein - inventor born in Hamilton, Ontario(40 years with NRC in Ottawa - helped design Canadarm. - electric wheelchair; microsurgical staple gun).
- Abraham Giesner (1797 - 1864) - physician, surgeon, geologist - created 'kerosene '.
- Alexander Graham Bell (1874 - 1922).
- *Sir Frederick Banting (1891 - 1941); Charles Best (1899 - 1978) - insulin.
- *Dr. Armand Frappier (1904 - ) - BCG > leukemia; leprosy studies; founded Microbiology Institute of Montreal.
- *Dr. Hans Selye (1907 - 1982 ) - endocrinologist; work on stress. (Also on a 1977Hungarian stamp - see later article in this issue.)
- *Dr. Maude Abbott ( 1869 - 1940 ) - congenital heart disease. (See later article in this issue.)
- Pablum - Dr. Frederick Tisdall, Dr. Alan Brown, Dr. T. G. H. Drake

Banting and Best

Frappier